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Name of Examination : **Summer 2021** - (Preview)

Course Code & Course Name : **ME352U - Turbo Machinery**

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Maximum Marks : **60**

Duration : **3 Hrs**

[Edit](#) [Print](#) [View Answer Key](#) [Close](#) **Answer Key Submission Type:** Marking scheme with model answers and solutions of numerical

Instructions:

1. All questions are compulsory.
2. Illustrate your answer with suitable figures/sketches wherever necessary.
3. Assume suitable additional data; if required.
4. Use of logarithmic table, drawing instruments and non programmable calculators is allowed.
5. Figures to the right indicate full marks.

- 1) Solve any three sub-questions.
 - a) Explain pressure compounding of steam turbine with neat sketch. [6]
 - b) At a particular stage of a reaction turbine, the mean blade speed is 60 m/s and the steam pressure is 3.5 bar with a temperature of 175 °C. The identical fixed and moving blades have inlet angles of 30 ° and outlet angles of 20°. Determine i) The blade height if it is 1/10 of the blade ring diameter, for a flow rate of 13.5 kg/s. ii) The power developed by a pair iii) The specific enthalpy drop if the stage efficiency is 85 %. [6]
 - c) Explain the governing of Pelton turbine in detail. [6]
 - d) A Kaplan turbine runner is to be designed to develop 7357.5 kW shaft power. The net available head is 5.50 m. Assume that the speed ratio is 2.09 and flow ratio is 0.68, and the overall efficiency is 60 %. The diameter of the boss is 1/3 rd of the diameter of the runner. Find the diameter of the runner, its speed and its specific speed. [6]
- 2) Solve any three sub-questions.
 - a) What is jet propulsion? Explain turbo-jet propulsion in detail. [6]
 - b) A reaction turbine works at 450 rpm under a head of 120 m. Its diameter at inlet is 120 cm and the flow area is 0.4 m² The angles made by absolute and relative velocities at inlet are 20 ° and 60 ° respectively with the tangential velocity. Determine i) Volume flow rate ii) The power developed and iii) Hydraulic efficiency [6]
 - c) Give the comparison between impulse and reaction steam turbine. [6]
 - d) Write short note on rocket propulsion. [6]
- 3) Solve any three sub-questions.
 - a) What is draft tube. Explain its working principle and types. [6]
 - b) In a single stage impulse turbine the blade angles are equal and the nozzle angle is 20 °. The velocity coefficient for the blade is 0.83. Find the maximum blade efficiency. If the actual blade efficiency is 90 % of maximum blade efficiency, Find the possible ratio of blade speed to steam speed. [6]
 - c) Explain Turbo-Propulsion in detail. [6]
 - d) Define various efficiencies of hydraulic turbine. [6]
- 4) Solve the following sub-questions.
 - a) What are the effects of cavitation? [3]
 - b) Define degree of reaction for hydraulic turbine. [3]

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